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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/761,112 | 01/20/2004 | Marc J. Scancarello | 0315-000499/DVA | 3127 |
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| HARNES, DICKEY & PIERCE, P.L.C. P.O. BOX 828 BLOOMFIELD HILLS, MI 48303 | | | EXAMINER MAZZUCA JR, DOUGLAS | |
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| | | | 3726 | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|---------------------------------------|---|--|
| Office Action Summary | Application No. 10/761,112 | Applicant(s) SCANCARELLO, MARC J. | |
| | Examiner Douglas E. Mazzuca | Art Unit 3726 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 1/20/2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 16-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☒ Claim(s) 1,5,10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 1/20/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>1/20/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 16-22, drawn to a method of forming a scroll component, classified in class 29, subclass 888.022.
 - II. Claims 1-15, drawn to a method for forming a scroll component, classified in class 29, subclass 527.3.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination (Group I) does not require sintering a green involute scroll form to form an involute scroll form. The subcombination has separate utility such as by attaching to something other than a base plate.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.
5. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.
6. This application contains claims directed to the following patentably distinct species of the claimed invention:

If applicant elects Group I above, applicant must also elect one of the following species:

Species A: Claim 17

Species B: Claims 18-21

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claim 16 is generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include

all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

7. During a telephone conversation with Christopher Eusebi on 10/24/2005 a provisional election was made without traverse to prosecute the invention of Group II, claims 1-15. Affirmation of this election must be made by applicant in replying to this Office action. Claims 16-22 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Information Disclosure Statement

8. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a

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separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Specification

9. The disclosure is objected to because of the following informalities:

In paragraph 0037 line 6, it is suggested that, "a close controls" be changed to -- close controls-- or --a close control--.

In paragraph 0046, lines 11-12, it is suggested that "It is conceivable that one scroll (e.g, the fixed contains graphite and the orbital does not)." the end parenthesis be moved after "the fixed".

Appropriate correction is required.

Claim Objections

10. Claim 1 is objected to because of the following informalities:

In line 7, it is suggested that "and" be changed to --an--.

Claim 5 is objected to because of the following informalities:

In line 2, it is suggested that "are of" be removed.

Claim 10 is objected to because of the following informalities:

In line 2, it is suggested the term --of-- be inserted between "plurality" and "morphologies".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 1-15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites the limitation **"*said mixture**"** in line 4, first paragraph. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1-9, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williamson (US Patent No. 5,580,401) in view of Akechi (US Patent No. 4,838,936). As to claim 1, Williamson discloses:

A: A method for forming a scroll component (**column 2 lines 65-67**)

B: A mold defining an involute scroll form cavity. (**Claim 6a**) The term "involute" in this case, is being defined to mean curled, or spiral.

C: Injecting the metal into said mold to form an involute scroll (**Column 6 lines 66-67**).

D: Removing the involute scroll from said mold. (**column 7, lines 15-17**)

Williamson, however, fails to disclose a metallic powder, a green state of the product, and the process of sintering. Akechi teaches:

A: A metallic powder (**column 1 line 7**)

B: A green state of the product. (**column 5 lines 66- column 6 lines 1-3**)

C: A sintering process after scroll is formed. (**Column 5 lines 16-17, column 6 lines 2-5**) Sintering is defined as heat-treatment without melting.

One purpose of using a metallic powder is to reduce the "skin effect" left after casting or molding a product. Due to the use of metallic powder, a "green" or unfinished state occurs. Sintering the "green" product helps combine the compounds on a chemical level, which reduces porosity, increases density, and in general creates a stronger product. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the scroll making methods of Williamson and Akechi in order to reduce the machining time by lowering the "skin effect" on metal scrolls.

15. In regard to Claim 2, Williamson does not disclose the use of a binder, however, Akechi discloses the practice of mixing a wax-binder (**column 3 lines 10-13**) with the metallic powder. The purpose of a binder is to help lubricate and facilitate the molding process. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the scroll making methods of Williamson and Akechi in order to lubricate the metal mixture so the metal does not stick to the dye walls or the injector.

16. As to Claim 3, Williamson discloses an iron metal (**column 2 lines 25-27**) yet fails to disclose the iron in a powder form. Akechi teaches a powder form of a metal (**column 1 line 7**) in the use of scroll making. The purpose of using a metallic powder is to reduce the "skin effect" left after casting or molding a product. The "skin" has to be machined off, which takes time and costs money. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the iron of Williamson and powder form of Akechi in order to reduce the skin effect left after molding the product.

17. In regards to claim 4, Williamson discloses the metal mixture comprising of: iron (**column 3 line 41**), carbon (**column 3 line 46**), nickel (**column 5 line 44**), molybdenum (**column 5 line 44-45**), chromium (**column 5 lines 33-34, also table 3**), and copper (**column 5 line 33, also table 3**). However, Williamson fails to disclose the metals being in powder form. Akechi teaches a method of making scrolls using metallic powder (**column 1 line 7, column 2 line 38**). The purpose of using metallic powder, other than the reasons mentioned above, is to help further in the creation of a consistent metal compound. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the metal mixture of Williamson and the powder form of Akechi in order to further facilitate the creation of a metallic compound.

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18. Concerning claim 5, Williamson does disclose an iron metal (**column 2 lines 25-27**), but fails to disclose its size and form. Akechi teaches a metallic powder (**column 1 line 7**) having a mean diameter greater than 5 micrometers (**column 2 lines 50-51**). Making the powder smaller than 5 micrometers would take too much machining and drive up costs. If the powder is too big, then it will not form properly with other powder particles when heat-treated. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the metal disclosed in Williamson and the form taught by Akechi in order to keep costs down while at the same time, allow the scroll to form properly during the molding process.

19. As to Claim 6, Williamson discloses a mixture of iron along with a percentage of carbon (**column 3 lines 48-51**), falling in the range of 0.7-3.5%. Furthermore, Williamson also adds copper and chromium (**Table 3**) to the mixture, which fall within the respected ranges of 0-10% and 0-2%. However, Williamson does not disclose the metallic mixture to be in a powder form. Akechi teaches a metallic powder (**column 1 line 7, column 2 line 38**) for use in making scrolls. The purpose of combining metals in powder form, other than the reasons listed above, allows for a uniform mixture of the metals during the molding process. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the metallic mixture of Williamson with the metallic powder of Akechi in order to create a uniform metal mixture for the scroll molding process.

20. Claim 7 asserts a product of at least 90% per volume pearlitic structure as disclosed by Williamson (**Column 5, lines 31-39**). In this case, the phrase "at least 90%" means mostly or "substantially entirely". However, Williamson fails to disclose the pearlitic structure being obtained through a sintering process. Akechi, however, teaches a sintering process (**column 5 lines 16-19**). Pearlite is a composition of alternating layers of ferrite and cementite formed from cooling hot austentite. The resulting structure is very tough. Sintering has been defined as heating without melting. In this case, sintering austentite, would not melt it and, if cooled properly, would act as a perfect means to facilitate the creation of pearlite. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the pearlitic structure of Williamson with the sintering process taught by Akechi in order to facilitate the production of pearlite in the scroll component and create a much tougher physical composition.

21. Regarding Claims 8-9, Williamson discloses the addition of inoculants to help form graphite particles (**column 4 lines 31-40**). Furthermore, it has been stated above that Williamson optionally adds carbon to the metal mixture. Graphite is a polymorph of Carbon (**column 3 lines 48-51**) and therefore any amount of graphite can be produced ranging from 0-20%. Williamson fails to disclose a sintering process to achieve a graphite state. Akechi teaches a sintering process to achieve a final product state. Through sintering, any amount of graphite required in the final product, based on how much inoculant was placed in the mixture, can be achieved. Therefore, it would have

been obvious to one of ordinary skill in the art at the time the invention was made to combine the graphite composition of Williamson with the sintering process of Akechi in order to achieve a desired amount of graphite in a powder metal scroll component.

22. Concerning claim 14, Williamson discloses all the above information except a machining step once the green involute scroll is removed from the mold. Akechi teaches accurately machining the finished blank before it is heat-treated (**column 5 lines 14-17**). The reason for machining the product while in the green state is because the metal is much more malleable and easier to manipulate, thus creating less time needed to machine the part, and less wear on the tool head of the machine. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the molding method of Williamson with the machining step of Akechi in order to more accurately refine the product while in a more ductile and malleable state.

23. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williamson (US Patent No. 5,580,401) in view of Akechi (US Patent No. 4,838,936) and further in view of Krause et al. (US Patent No. 5,594,186). Williamson/Akechi disclose all elements listed above but fail to disclose the use of a metallic powder with varying morphologies. Krause et al. teach an iron metallic powder with varying morphologies. Krause et al. teaches both spherical (**column 2 lines 27-32, column 3 lines 54-60**) and triangular (**column 4 lines 60-65**) morphologies. Furthermore, the triangular

morphologies can range in various average sizes (**column 5 lines 23-25**). The purpose of having different morphologies and sizes of powder particles is to effectively fill the gaps and porosities in the matrix and to increase the density. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the methods of scroll making of Williamson and Akechi with the powder sizes and shapes of Krause et al. in order to create a stronger and denser scroll.

24. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williamson (US Patent No. 5,580,401) in view of Akechi (US Patent No. 4,838,936) and further in view of Matsuyama et al. (EP Patent No. 0053301). Williamson/Akechi disclose all elements listed above including, mixing graphite particles with the metallic mixture (**Akechi column 2 lines 24-32**), but fail to disclose metal coated graphite particles, in specific, copper coated graphite particles. Matsuyama et al. teach the introduction of copper coated graphite particles into a powder (**page 4 lines 7-10, page 7 lines 11-14**). The purpose of copper coated graphite particles is to act as a lubricant so that the base metal does not stick to the mold. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the scroll making methods of Williamson and akechi with the lubricating method of Matsuyama in order to ease the molding process so as to not let the scroll component stick to the mold.

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25. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williamson (US Patent No. 5,580,401) in view of Akechi (US Patent No. 4,838,936) and further in view of Nippon Steel Corp. (JP 05161947). Williamson/Akechi disclose all elements listed above except for the introduction of magnesium sulfide in the metallic mixture. Williamson does mention the introduction of manganese with trace amounts of sulfur (**column 3 lines 55-67, and table 1**), yet fails to stoichiometrically combine them. Nippon Steel Corp. teaches the mixing of magnesium sulfide powder with iron powder (**Abstract lines 1-3**). The purpose of having magnesium sulfide incorporated in the mixture is to help in later machining. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the scroll making methods of Williamson and Akechi with the introduction of magnesium sulfide taught by Nippon Steel Corp. in order to facilitate the machinability of the scroll after the molding process is complete.

26. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williamson (US Patent No. 5,580,401) in view of Akechi (US Patent No. 4,838,936) and further in view of Futagami et al. (US Patent No. 6,299,424). Williamson/Akechi disclose all of the elements of the claim as listed above, but fail to disclose a density of 6.8 gm/cm³ after sintering. Futagami et al. teach an iron element, through repeated sintering, to have a density of 7.3 gm/cm³ or higher (**Column 4, lines 44-48**). Having a density higher than 6.8gm/cm³ would have been obvious in order to comply with the fatigue strength requirements of the scroll. Therefore, it would have been obvious to

one of ordinary skill in the art at the time the invention was made to combine the scroll making methods of Williamson and Akechi with the process of creating a high density of Futagami et al. in order to meet the minimal fatigue strength requirements of the scroll.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas E. Mazzuca whose telephone number is (571)272-7813. The examiner can normally be reached on 7:30AM-4PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Bryant can be reached on (571)272-4526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Douglas Mazzuca
10/28/05

DEM



David P. Bryant
Primary Examiner